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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF

December 10, 2002

Mr. Stephen T. Washburn
Environ International Corporation
214 Carnegie Center
Princeton, NJ 08540-6284

Subject: Response to Comments from Environ regarding the January 2002 Final (Revised) Human Health Risk Assessment, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

Dear Mr. Washburn:

The following are the United States Environmental Protection Agency's (EPA) response to comments submitted by Environ International Corporation (Environ) to EPA Region 5 in a letter dated September 19, 2002. The comments relate to the January 2002 *Final (Revised) Human Health Risk Assessment, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site*, prepared for the Michigan Department of Environmental Quality. Each Environ comment is listed in italics, followed by EPA's response.

General Comments

Environ Comment – *Overall, I have concluded that the HHRA relies on screening level approaches in evaluating exposures to the former impoundment and floodplain soils, and that these approaches are not appropriate for a baseline risk assessment. As a result, the HHRA substantially overstates potential exposures and risks associated with PCBs in soils in the vicinity of the former Plainwell, Otsego, and Trowbridge dams.*

EPA Response – According to EPA's *Risk Assessment Guidance for Superfund – Volume I, Human Health Evaluation Manual (Part A)*, Section 1.1.2 (EPA 1989), a "baseline risk assessment" is "an analysis of the potential adverse health effects (current or future) caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these releases (i.e., under an assumption of no action)". The HHRA prepared in relation to floodplain soils at the API/PC/KR Superfund Site meets the EPA definition of a "baseline risk assessment", regardless of the level of conservatism associated with risk assessment assumptions, because the report addresses exposures and potential risks/hazards associated with contaminated media at the Site in absence of remediation efforts. The appropriateness of risk assessment scenarios and exposure assumptions employed in the assessment is addressed in responses to the specific Environ comments below.

Specific Comments

Data Evaluation

Environ Comment – *Based on my review, the HHRA does not evaluate the soil data in a manner that is consistent with EPA risk assessment guidance, or that provides a reasonable basis for estimating potential exposures at the site. Specifically:*

1) The HHRA does not differentiate between soil samples collected within the former impoundments, and samples collected outside those impoundments. The soil samples classified as "floodplain soils" in the HHRA were actually collected from two distinct areas:

- *"Former impoundment soils", collected from within the former impoundments. These soils consist of sediments previously overlain by river water before the dams were removed.*
- *"Historical floodplain soils", collected from outside the former impoundments. These soils were affected by flooding events, either before or after removal of the dams.*

Within each of the three impoundments areas (i.e., Plainwell, Otsego, and Trowbridge), the HHRA combines the historical floodplain and former impoundment sample results in evaluating potential exposures to soils. This approach is not appropriate in estimating human health risks at the Site, because these two types of soils have different characteristics that effect exposure potential. For example, concentrations of PCBs are generally lower (e.g., averaging less than 2 mg/kg) in the historical floodplain soils, and higher in the former impoundment soils. The former impoundment soils, on the other hand, are generally more remote from areas where people live or work. These important differences should be considered in the HHRA, and their impact on potential human health risks evaluated.

EPA Response – The comment regarding the apparent differences in characteristics of "former impoundment soils" and "historical floodplain soils" is noted. However, combining data for both types of soils for each impoundment is equally appropriate to the approach proposed by Environ in the context of decision support for remedial action determinations. Also, the distinction between floodplain soils and impoundment soils, to the degree that a distinction exists, is likely to be imperceptible to a potential receptor, whether residential or recreational, thus obviating the need to treat the material as two separate exposure media. Also, in the event that both types of soils are evaluated for potential remedial action through comparison to risk-based remediation goals, any distinction between the two types of soils is irrelevant, as areas in exceedence of approved remediation criteria will require further attention, regardless of their classification as "former impoundment soils" and "historical floodplain soils". Exposure assumptions and data evaluation methods in the HHRA do not affect this reality. Finally, sufficient receptors (residential, recreational) are evaluated to provide the risk manager with information needed to address risks in different reaches of the river.

Environ Comment - *The HHRA does not follow EPA risk assessment guidance in determining exposure point concentrations in soil. Within each impoundment area, the HHRA estimates potential exposures based on maximum and mean concentrations in soil, "to reflect a range of exposure point concentrations" (Section 3.5.3). Contrary to EPA risk assessment guidance, the HHRA does not determine the distribution of data across defined exposure areas to develop conservative estimates of the*

mean PCB concentrations, such as 95% upper confidence on the mean (UCL) values, to serve as exposure point concentrations.

EPA Response -EPA guidance found in *RAGS, Part A* (EPA 1989) as well as *Supplemental Guidance to RAGS: Calculating the Concentration Term* (EPA 1992) indicates the appropriateness of using the UCL95 to represent the exposure point concentration for a contaminant in a given medium. However, sediment data were not normal, and EPA guidance suggests methods from Gilbert (1987)[1] to calculate a UCL in such cases. When this approach was applied to the data, UCL estimates significantly exceeded maximum detected concentrations. For example, for the Otsego Impoundment area, UCL estimates for the top three sediment depths (0-6", 6-12", 12-24") were 1351, 1368, and 3961 mg/kg. These estimates are more than an order of magnitude higher than the maximum detected concentration (113 mg/kg). Though not as extreme, UCL estimates for other impoundment areas also exceeded maximum concentrations. In cases where the UCL estimates exceed maximum, EPA guidance recommends the use of the maximum concentration. The risk assessment reasonably used both the maximum and arithmetic mean contaminant concentrations to "bracket" the potential average and maximum exposures and associated risks/hazards, so that the risk manager would have more information than that provided from the conservative use of maximum concentrations.

Environ Comment - *Standard risk assessment practice requires a careful evaluation of the data used to estimate potential exposures. For example, according to EPA's Risk Assessment Guidance for Superfund - Volume I, Human Health Evaluation Manual (Part A) (EPA 1989), "In evaluating monitoring data for the assessment of soil contact exposures, the spatial distribution of the data is a critical factor". However, as discussed above, the HHRA does not consider the spatial distribution of the "floodplain soil" data, including differences between historical floodplain and former impoundment soils, or the effect that the data distribution may have on potential exposures and risks.*

EPA Response - With regard to spatial considerations, *RAGS, Part A*, Section 6.5.1 (EPA 1989) states the following:

> "When evaluating chemical contamination at a site, it is important to review the spatial distribution of the data and evaluate it in ways that have the most relevance to the pathway being assessed. In short, consider where the contamination is with respect to known or anticipated population activity patterns. Maps of both concentration distribution and activity patterns will be useful for the exposure assessment. It is the intersection of activity patterns and contamination that defines an exposure area."

The RI process involved extensive statistical evaluation and mapping of sampling locations and areas of exposed sediments and floodplain soils. The results of the analysis showed high variability in PCB concentrations over small areas and with depth. This high heterogeneity on a small scale suggested that exposure concentrations would not vary greatly when considering smaller and larger areas or shallower and deeper sediments. Thus, the HHRA reasonably considered only larger areas. Results from these larger areas can reasonably be used to assess possible exposures on a smaller scale.

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[1] Gilbert, R.O. 1987. Statistical Methods for Environmental Pollution Monitoring. Van Nostrand Reinhold New York, NY.

Data Evaluation

Environ Comment - *The HHRA evaluates two populations that may be exposed to PCBs in "floodplain soils":*

- *"Nearby Resident", who live in the vicinity of the Site.*
- *"Recreationalists", who periodically visit the Site to fish, hunt, or engage in other outdoor activities.*

There are no homes currently located on "floodplain soils", and future land use is restricted within the 100-year floodplain of the Kalamazoo River. Thus, the HHRA concludes that residential development of the "floodplain soils" is not an appropriate current or future scenario. Instead, the HHRA evaluates nearby residents, who live in areas adjacent to the "floodplain soils". However, in evaluating the nearby resident scenario, the HHRA uses exposure assumptions that are virtually identical to EPA's conservative defaults for a standard "residential" scenario. For example, the HHRA assumes that 100% of the soil ingested by nearby residents each day is "floodplain soil", for 350 days per year, for up to 30 years. In fact, the HHRA even assumes that 100% of the soil ingested each day by small children (age 1 through 6) is "floodplain soil", under the nearby resident scenario. The exposure assumptions used in the HHRA under the nearby resident scenario are especially inappropriate for the former impoundment soils, the vast majority of which are remote from residential areas.

The HHRA assumes that the "recreationalist" will be exposed to "floodplain" soils for 128 days per year, for up to 24 years, from age 6 through 31 (see Table 3-5). The HHRA indicates that this exposure frequency is site-specific, and based on the proximity of recreational and residential areas to the Site. However, the HHRA does not present any data supporting the estimated exposure frequency. In fact, available information suggests that the frequency of contact with "floodplain soils" by recreational visitors is likely to be significantly lower. For example, data presented in A Survey of Anglers Residing Near the Kalamazoo River Basin (Atkin, 1994) indicate that the average frequency of fishing along the Kalamazoo River is only approximately 20 to 25 days per year, for active anglers.

EPA Response - With regard to residential receptors, assumptions used in the quantitation of exposure intakes, and risk/hazard values are consistent with EPA and MDEQ guidance. The rationale for using standard residential exposure factors relates to the proximity of residential receptors to adjacent floodplain soils. During field investigation activities on the river, MDEQ staff observed residents using the floodplain essentially as an extension of their back yards (e.g. gardens in the floodplain). It is clear that the residential scenario reflects reality and past exposure. In some areas, residential-type exposures cannot be ruled out. Further, the river is dynamic. It is our contention that soils that are currently remote could be moved by riverine processes to areas that are more easily accessible; flooding and erosional processes could easily move sediments from one area of an impoundment to another. Also, dam owners have expressed a desire to remove their dams, which would change the dynamic of the river and result in a shift of floodplain boundaries and increase the area potentially open to residential use.

Oddly enough, there is a technical disconnect in what the KRSG is requesting in their letter. The King Highway Landfill Risk Assessment, created by the KRSG's own consultant, included a direct contact exposure frequency of 245 days per year for anglers and 200 days per year for trespassers. In comparison, the MDEQ risk assessment assumes a direct contact exposure

frequency of only 128 days per year for anglers/recreationalists. We find it ironic and inconsistent that the KRSG now calls the MDEQ exposure assumptions too high, when the MDEQ assumptions are already lower than those in KRSG's own risk assessments. Frankly, compared what the KRSG has used in the past, we see the exposure assumptions of the MDEQ risk assessment as sufficiently realistic and appropriately conservative.

Further, analysis of a residential scenario in the impoundments is consistent with the Administrative Order by Consent (AOC) between the State of Michigan and the Kalamazoo River Study Group, which specifically required the feasibility study to develop a variety of remedial actions to satisfy a range of performance objectives. As the AOC requires residential (unrestricted) cleanups to be evaluated, the Human Health Risk Assessment needed to provide corresponding potential cleanup criteria. Not only did the EPA agree with this approach, but actually directed the DEQ in 1992 to evaluate the residential scenario for both the Kalamazoo River and Portage Creek exposed floodplains, as the scenario is generally the most conservative. Please note that the risk assessment remains silent on the issue of where the residential or recreational criteria would actually apply. Application of potential cleanup criteria is a risk management decision that typically evaluated in a feasibility study and established by a Record of Decision. Contrary to the exaggerated assertions of Environ, the risk assessment, in evaluating the recreational and residential scenarios, was intended to provide flexibility to risk managers.

Regarding recreational receptors, this scenario involves the assumption of the receptor's participation in various recreational activities (e.g., swimming, boating, hunting and fishing), all of which would present opportunities for direct contact with floodplain soils. Moreover, because people living along the river would have very easy access to recreational opportunities, upper-range estimates for exposure frequency were chosen to be relatively high. The exposure frequency assumption of 128 days/year is based on the assumption of exposure 4 days per week during the warmer months when snow and ice would not be present (8 months or 32 weeks).

One should note that average exposure frequencies, such as that provided for fishermen in the comment above, are not appropriate for developing an upper-range exposure estimate. Further, the recreational visitor envisioned is one that uses the river for a variety of purposes that may change over the years. Fishing may represent only a fraction of the time spent at the river and environs. For example:

- The Michigan Department of Natural Resources provided a list of recreational activities expected to occur at the impoundments. The list was adapted from major recreational uses, identified in the Allegan State Game Area Master Plan (DNR 1993). Several of these anticipated recreational activities were mentioned in the HHRA, including: fishing, hunting, boating, canoeing, picnicking, mushroom and berry picking, wild food gathering, sightseeing, wild animal observation, and bird watching. Activities also identified by MDNR, but not specifically mentioned in the HHRA include nature study, educational groups, dog training, photography, furbearer trapping and bicycling.

- Hunting is permissible in the impoundments approximately 248 days out of the year (from mid September thru May). For approximately 168 days per year, two or more

hunting seasons are open in the impoundment areas. It is reasonable to anticipate that the angler may also spend time on the river hunting; hunting days would be *in addition* to angling days.

- The Michigan Department of Natural Resources indicates they regularly receive requests from universities and organizations (many of which are local to the watershed) to conduct research on state lands and the impoundments. For example, Michigan State University students, in 2000 and 2001, spent over 3,000 man-hours, over approximately 200 days in and around the impoundments and floodplains. In addition, in 2001 and 2002, the United States Geologic Survey has conducted intensive research in the impoundments. There is no reason to believe that research projects will cease in the river basin. While "researchers" are not specifically evaluated in the risk assessment, the conservative assumptions built in to the resident and recreationalist scenarios could be seen as adequately covering this activity

Considering the variety of potential activities in the impoundments, we believe the assumption of 128 days per year is appropriate. Still, we acknowledge there is some inevitably some uncertainty associated with parameters such as exposure frequency. We believe this uncertainty, which is inherent to every risk assessment, is addressed adequately in the uncertainty assessment (Section 7) of the risk assessment document. In fact the possibility that residential exposure assumptions could overestimate the risk for impoundment areas that are not easily accessible to residents is a point specifically discussed in the uncertainty analysis. This is precisely why a recreational scenario was developed.

Also in response to critiques regarding the conservative nature of HHRA assumptions, the HHRA data evaluation for floodplain and impoundment soils considered only the upper six inches as being accessible for exposures to potential residential and recreationalist receptors, a less than conservative assumption. Common risk assessment practice includes assumptions of depths up to two feet below ground surface as surface soils available for direct contact exposures. Incorporation of the next soil depth interval (0.5 to 1.5 feet) into the determinations of average and maximum EPC values would result in the following revised HHRA Table 2-3, summarizing EPC values.

Table 2-3 Floodplain Soil Data, API/PC/KR Site

Area	Frequency	Range	Average	Maximum
Plainwell	61/71	0.048 - 85	12.28	85
Otsego	54/70	0.179 - 116.7	12.28	116.7
Trowbridge	111/137	0.026 - 81.1	12.23	81.1

The average PCB concentrations would increase for Plainwell and Otsego from 10.9 mg/kg to 12.3 mg/kg and 8.4 mg/kg to 12.3 mg/kg, respectively. The maximum EPC for Otsego increased from 36 mg/kg to 116.7 mg/kg. In light of these alternative EPCs, the average cancer risks and noncancer hazard estimates calculated for residential and recreationalist receptors would increase slightly for Plainwell and Otsego, while more than a three-fold increase would be observed in the maximum hazard and risk values for Otsego. In light of these observations, the assumptions used in the HHRA represent a balance of conservatism and site-specific considerations.

In addition, EPA would like to point out that the HHRA only addresses the risks associated with PCBs, though the toxicity of individual chemicals within a mixture is additive. This is another legitimate reason taking a conservative approach in assessing risks. The HHRA could be expanded to include a review of the risks posed by dioxins and furans if the contaminated sediments will not be removed or otherwise contained from human contact. The results of the dioxin/furan analysis conducted by EPA during the 2001 field event report that toxicity equivalence quotient (TEQ) for samples designated as sediment by EPA had an average TEQ of 124 ng/kg with a maximum of 471 ng/kg. Those samples designated as soils by EPA had an average TEQ of 267 ng/kg with a maximum of 700 ng/kg. Both the average and maximum values in sediments and soils exceed the MDEQ residential criteria of 90 ng/kg.

Please feel free to contact me if you have any questions or comments regarding the responses provided above.

Sincerely,

for Shari Kolak

Shari Kolak
Remedial Project Manager
Superfund Division

Cc: J. Milt Clark, US EPA
Brian von Gunten, MDEQ
Mark Brown, BBL